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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,853	09/29/2003	Katayun Barmak	YOR920030338US1	6319

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EXAMINER	
GRAYBILL, DAVID E	
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2822	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/674,853	BARMAK ET AL.	
	Examiner	Art Unit	
	David E. Graybill	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 August 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *19,21-27,30-32,38,41,43,44,47-49 and 52-65* is/are pending in the application.

4a) Of the above claim(s) *30-32 and 60* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *19,21-27,38,41,43,44,47-49,52-59 and 61-65* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 19, 26, 38, 41, 42, 44, 47, 49, 52, 53, 58, 59 and 61 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Hegde (6136682).

In the abstract, title and at column 2, line 59 to column 3, line 5; column 3, lines 24-44; column 4, lines 19 and 42-53; column 4, line 63 to column 5, line 13; column 5, lines 26-29 and 44-57; column 6, lines 63-64; and column 8, lines 25-58, Hegde discloses the following:

Re claim 19: A diffusion barrier comprising a plurality of stacked sub-layers 12, 14, each sub-layer having a thickness of about 0.4 to about 4.5 nanometers (nm), to inhibit the formation of a crystalline lattice "the second amorphous barrier layer is typically formed as a crystalline material, but is formed as an amorphous material due to the presence of the first

amorphous layer," wherein the plurality of stacked sub-layers are arranged collectively to inhibit diffusion "prohibiting diffusion" of a chemical species through the diffusion barrier, wherein a successive sub-layer comprises a different material from a material that comprises a preceding sub-layer and the different materials selected to comprise the sub-layers are substantially immiscible and exhibit mutual adhesion, and the overall thickness of the diffusion barrier is between about 30 and 50 angstrom "A collective thickness of the tantalum nitride and titanium nitride layers 12 and 14 is roughly 400 angstroms or less," "the thickness of the entire composite layer is roughly equal to 400 angstroms or less," "a thickness of the composite barrier layer does not exceed 400 angstroms," and, "the collective thickness of the layers 106 and 108 will typically not exceed 400 angstroms"; wherein the plurality of stacked sub-layers are three or more stacked sub-layers.

Re claim 26: A diffusion barrier as in claim 19, where one of the materials is a metal nitride "TiN".

Re claim 58: A diffusion barrier as in claim 19, where at least one of the sub-layers comprises a metal nitride.

Re claim 59: A diffusion barrier as in claim 19, where said sub-layers are alternately comprised of tantalum nitride (TaN) and titanium nitride (TiN).

Re claim 61: A diffusion barrier as in claim 19, where the plurality of sub-layers are between three and ten in number.

Re claim 38: A multilayer diffusion barrier comprised of interfaces and atomically thin films 12, 14 "roughly 20 angstroms," "A collective thickness of the tantalum nitride and titanium nitride layers 12 and 14 is roughly 400 angstroms or less," "the thickness of the entire composite layer is roughly equal to 400 angstroms or less," "a thickness of the composite barrier layer does not exceed 400 angstroms," and, "the collective thickness of the layers 106 and 108 will typically not exceed 400 angstroms" in which surface adhesion of each interface inhibits the formation of a lattice in the films individual film layers "the second amorphous barrier layer is typically formed as a crystalline material, but is formed as an amorphous material due to the presence of the first amorphous layer," inhibiting diffusion across the barrier, wherein thickness of each film is in a range of about 0.4 to about 4.5 nm, wherein a successive film comprises a different material from a material that comprises a preceding film; wherein the atomically thin films are at least three in number.

Re claim 41: A multilayer diffusion barrier structure comprised of three or more sub-layers 12, 14 each having a thickness of about 0.4 to about 4.5 nanometers (nm) and an interface, wherein the interface of each of the sub-layers dominates a lattice formation on the sub-layers, preventing the

formation of a lattice and grain boundaries "the second amorphous barrier layer is typically formed as a crystalline material, but is formed as an amorphous material due to the presence of the first amorphous layer," the multilayer structure being arranged to inhibit diffusion of a chemical species through the structure, wherein a successive sub-layer 14 comprises a different material from a material that comprises a preceding sub-layer 12.

Re claim 44: A multilayer structure comprised of at least two films 12, 14 forming a bond at an interface between each film, each film having a thickness of about 0.4 to about 1.5 nm, wherein the interface dominates a lattice formation, inhibiting the formation of a lattice and grain boundaries "the second amorphous barrier layer is typically formed as a crystalline material, but is formed as an amorphous material due to the presence of the first amorphous layer," wherein a successive film comprises a different material from a material that comprises a preceding film, wherein at least one of the films comprises a dielectric material "TaN".

Re claim 47: The multilayer structure of claim 44, wherein the at least two materials exhibit mutual adhesion and are substantially immiscible.

Re claim 49: The multilayer structure of claim 44, wherein at least one of the materials is a nitride.

Re claim 52: The multilayer structure of claim 44, inherently having inherent flexibility and inherently inhibited work hardening.

Re claim 53: The multilayer structure of claim 44, which is a diffusion barrier between two materials that are otherwise capable of combining chemically or between a layer and a surface capable of chemically combining with the layer.

To further clarify the disclosure of atomically thin films, in addition to "atomically thin" being encompassed by the scope of the disclosures, "A collective thickness of the tantalum nitride and titanium nitride layers 12 and 14 is roughly 400 angstroms or less," "the thickness of the entire composite layer is roughly equal to 400 angstroms or less," "a thickness of the composite barrier layer does not exceed 400 angstroms," and, "the collective thickness of the layers 106 and 108 will typically not exceed 400 angstroms," "atomically thin" is also encompassed by the scope of the disclosure "roughly 20 angstroms," because, as confirmed in the instant specification, page 7, lines 2-4, 20 angstroms is in a range of 2 to 10 atoms thin.

To further clarify the disclosure of three or more sub-layers, and the plurality of sub-layers are between three and ten in number, Hegde discloses "a composite or amorphous barrier layer," "a composite barrier layer," "a barrier layer," "an amorphous barrier material," and "a tantalum silicon nitride material but can be any other amorphous barrier material," and it is well settled that the term "a" or "an" ordinarily means "one or more." Tate

Access Floors, Inc., and Tate Access Floors Leasing, Inc., v. Interface Architectural Resources, Inc., 279 F.3d 1357; 2002 U.S. App. LEXIS 1924; 61 U.S.P.Q.2D (BNA) 1647 ((citing Tate Access Floors, Inc. v. Maxcess Techs., Inc, 222 F.3d 958, 966 n.4, 55 U.S.P.Q.2D (BNA) 1513, 1518 [**32] (citing Elkay Mfg. Co. v. Ebco Mfg. Co., 192 F.3d 973, 977, 52 U.S.P.Q.2D (BNA) 1109, 1112 (Fed. Cir. 1999))).

To further clarify the disclosure of the structure inherently having flexibility and inherently inhibited work hardening, as cited supra, Hegde discloses the structure having no grain boundaries. Further, in the specification, at page 9, lines 11-13, applicant discloses that the structure having flexibility and inhibited work hardening is an inherent result of the structure having no grain boundaries.

In the alternative, claims 19, 26, 38, 41, 42, 44, 47, 49, 52, 53, 58, 59 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hegde (6136682).

Hegde is applied as applied to claims 19, 26, 38, 41, 42, 44, 47, 49, 52, 53, 58, 59 and 61 supra.

However, Hegde does not appear to disclose **verbatim** the claimed layer thickness limitations: "of about 0.4 to about 1.5 nm," and, "atomically thin."

Nonetheless, as cited, Hegde discloses, "roughly 20 angstroms," "the thickness of the entire composite layer is roughly equal to 400 angstroms or less," "a thickness of the composite barrier layer does not exceed 400 angstroms," and that layer thickness is a result effective variable with "thinner barrier layers . . . when compared to the prior art" being desirable. Therefore, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that, in view of the applied prior art, the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. In fact, at page 7, line 16 to page 8, line 3, applicant discloses that the purpose of the particular claimed layer thickness limitations is merely to provide an amorphous layer, "In order to avoid the formation of a crystalline structure the diffusion barrier sub-layers 350, 360 are preferably no more than 2-5 atomic layers thick (0.4 to 1.5 nm), and thus, the resulting structure has the form of an essentially or substantially amorphous material thereby beneficially inhibiting diffusion through the material." Moreover, Hegde discloses the identical purpose of the invention is the provision of a thin amorphous layer. Also, it appears prima facie that the claimed product would possess utility using another dimension. Indeed,

it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). In any case, at page 12, lines 14-16, applicant explicitly discloses that the particular claimed thicknesses are an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization, "It should thus be appreciated that the foregoing examples of materials and thicknesses are not limiting, for example the total thickness of the barrier layer 315 will be a function of the selected constituent elements and/or molecules (e.g. nitride and/or oxides)."

Claims 21-25, 27, 43, 48, 55-57 and 62-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hegde as applied to claims 19 and 44, and further in combination with Toyoda (6001461).

As cited, Hedge discloses the following:

Re claim 43: A multilayer diffusion barrier for inhibiting diffusion of chemical species there through, comprising a plurality of stacked layers

comprised of alternating films of at least two different materials, the thickness of each of said films being between about 0.4 to about 4.5 nm "roughly 20 angstroms," "A collective thickness of the tantalum nitride and titanium nitride layers 12 and 14 is roughly 400 angstroms or less," "the thickness of the entire composite layer is roughly equal to 400 angstroms or less," "a thickness of the composite barrier layer does not exceed 400 angstroms," and, "the collective thickness of the layers 106 and 108 will typically not exceed 400 angstroms" in which surface adhesion of each interface inhibits the formation of a lattice in the films individual film layers "the second amorphous barrier layer is typically formed as a crystalline material, but is formed as an amorphous material due to the presence of the first amorphous layer," which is predetermined to substantially eliminate work hardening, wherein a successive layer of the plurality of stacked layers comprises a different material from a material that comprises a preceding layer of the plurality of stacked layers.

However, Hegde does not appear to explicitly disclose the following:

Re claim 43: wherein a successive layer of the plurality of stacked layers comprises a different metal from a metal that comprises a preceding layer of the plurality of stacked layers.

Re claim 21: A diffusion barrier as in claim 19, where one of the materials is scandium (Sc).

Re claim 22: A diffusion barrier as in claim 19, where one of the materials is copper (Cu).

Re claim 23: A diffusion barrier as in claim 19, where one of the materials is yttrium (Y).

Re claim 24: A diffusion barrier as in claim 19, where one of the materials is lanthanum (La).

Re claim 25: A diffusion barrier as in claim 19, where one of the materials is tantalum (Ta).

Re claim 27: A diffusion barrier as in claim 19, where one of the materials is an oxide.

Re claim 48: The multilayer structure of claim 44, wherein at least one of the materials is a metal.

Re claim 54: A diffusion barrier as in claim 19, where said sub-layers are alternately comprised of copper (Cu) and tantalum (Ta).

Re claim 55: A diffusion barrier as in claim 19, where said sub-layers are alternately comprised of scandium (Sc) and tantalum (Ta).

Re claim 56. A diffusion barrier as in claim 19, where said sub-layers are alternately comprised of yttrium (Y) and tantalum (Ta).

Re claim 57: A diffusion barrier as an claim 19, where said sub-layers are alternately comprised of lanthanum (La) and tantalum (Ta).

Re claim 62: A diffusion barrier as in claim 19, wherein each of the plurality of sub-layers comprises a metal.

Re claim 63: A multilayer diffusion barrier as in claim 38, wherein each of the atomically thin films comprises an element that is a metal.

Re claim 64: A multilayer diffusion barrier structure as in claim 41, wherein each of the sub-layers comprises a metal.

Re claim 65: The multilayer structure of claim 44, wherein each of the films comprises a metal.

However, Toyoda discloses these limitations at column 3, lines 24-34; column 3, line 54 to column 4, line 21; and column 5, line 21 to column 6, line 3: (in particular, "Examples of such Cu amorphous alloys are $Ti_x Cu_{1-x}$ ($0.18 \leq x \leq 0.70$), $Zr_x Cu_{1-x}$ ($0.18 \leq x \leq 0.70$), $Hf_x Cu_{1-x}$ ($0.20 \leq x \leq 0.70$), $Y_x Cu_{1-x}$ ($0.10 \leq x \leq 0.53$) and $Ta_x Cu_{1-x}$ ($0.20 \leq x \leq 0.80$) . . . $V_x Co_{1-x}$ ($0.15 \leq x \leq 0.80$), $Nb_x Cr_{1-x}$ ($0.25 \leq x \leq 0.45$), $Nb_x Co_{1-x}$ ($0.22 \leq x \leq 0.55$), $Ta_x Cr_{1-x}$ ($0.25 \leq x \leq 0.40$), $Ta_x Co_{1-x}$ ($0.25 \leq x \leq 0.45$), $Cr_x Co_{1-x}$ ($0.50 \leq x \leq 0.70$), $Mo_x Co_{1-x}$ ($0.20 \leq x \leq 0.60$), and $W_x Co_{100-x}$ ($0.20 \leq x \leq 0.60$)," "Moreover, an amorphous thin film may be of multi-layer structure where different amorphous materials are laminated."). In addition, Hegde discloses that the diffusion barrier is "any amorphous barrier layer." Therefore, it would have been obvious to combine this disclosure of Toyoda with the disclosure of Hegde because it would provide the "any amorphous barrier layer" of Hegde.

Applicant's amendment and remarks filed 8-15-7 have been fully considered and are treated supra and infra.

Applicant alleges, "The disclosure of Hegde only teaches a two layer diffusion barrier. Hegde does not appear to disclose or suggest anything other than a two layer interconnect to form a barrier that "separates the metallic interconnect (e.g., copper) from the silicon-containing region, prohibiting diffusion of copper" (e.g., column 4, lines 17- 19)." This allegation is respectfully traversed because, as elucidated in the rejection, Hegde discloses more than only a two layer interconnect.

In addition, applicant contends, "Hegde teaches away from any arrangement other than a two layer diffusion barrier."

This argument is respectfully traversed because Hegde merely discloses examples and preferred embodiments, and disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. In re Susi, 169 USPQ 423 (CCPA 1971). "A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use." In re Gurley, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10

USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). To further clarify, a prior art opinion that a claimed invention is not preferred for a particular limited purpose, does not preclude utility of the invention for that or another purpose, or even preferability of the invention for another purpose. Moreover, even a teaching away from a claimed invention does not necessarily render the invention patentable. See Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998), where the court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed." Similarly, in In re Geisler, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997) applicant argued that the prior art taught away from use of a protective layer for a reflective article having a thickness within the claimed range of "50 to 100 Angstroms." Specifically, a patent to Zehender, which was relied upon to reject applicant's claim, included a statement that the thickness of the protective layer "should be not less than about [100 Angstroms]." The court held that the patent did not teach away from the claimed invention. "Zehender suggests that there are benefits to be derived from keeping the protective layer as thin as possible, consistent with achieving adequate protection. A thinner coating reduces light absorption and minimizes

manufacturing time and expense. Thus, while Zehender expresses a preference for a thicker protective layer of 200-300 Angstroms, at the same time it provides the motivation for one of ordinary skill in the art to focus on thickness levels at the bottom of Zehender's suitable range - about 100 Angstroms - and to explore thickness levels below that range. The statement in Zehender that [i]n general, the thickness of the protective layer should be not less than about [100 Angstroms] falls far short of the kind of teaching that would discourage one of skill in the art from fabricating a protective layer of 100 Angstroms or less. [W]e are therefore not convinced that there was a sufficient teaching away in the art to overcome [the] strong case of obviousness made out by Zehender." See MPEP 2144.05II and MPEP 2145, paragraph X.D..

Applicant also asserts, "Applicants respectfully assert that unexpected results are present as a result of the claimed invention."

This argument is respectfully traversed and deemed unpersuasive because applicant has not identified the alleged unexpected results. In any case, unexpected results cannot be relied on to overcome a rejection based on anticipation. Specifically, Hegde clearly anticipates claims 19, 26, 38, 41, 42, 44, 47, 49, 52, 53, 58, 59 and 61 invention; therefore, Hegde inherently discloses the alleged unexpected results. Furthermore, applicant originally disclosed and presently discloses (see, for example, the abstract), and

originally claimed and presently claims, embodiments of the invention not limited to any allegedly unexpected results. As indicated in MPEP 2164.089(c), "Broad language in the disclosure, including the abstract, omitting an allegedly critical feature having unexpected results, tends to rebut the arguments of unexpected results." In any case, as elucidated in the Office action, it is respectfully submitted that, at best, applicant has merely presented evidence of routine experimentation and optimization. However, unexpected results must be established by factual evidence, and not, as here, by mere argument. See, for example, In re De Blauwe, 736 F.2d 699, 222 USPQ 191, 196 (Fed. Cir. 1984), and MPEP 716.02(d), "Demonstrating Criticality of a Claimed Range." To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. In re Hill, 284 F.2d 955, 128 USPQ 197 (CCPA 1960). To this end, the arguments of counsel cannot take the place of evidence in the record. In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965). Instead, the evidence relied on should establish "that the differences in results are in fact unexpected and unobvious and of both statistical and practical significance." Ex parte Gelles, 22 USPQ2d 1318, 1319 (Bd. Pat. App. & Inter. 1992). See also, Ex parte C, 27 USPQ2d 1492 (Bd. Pat. App. &

Inter. 1992); In re Nolan, 553 F.2d 1261, 193 USPQ 641, 645 (CCPA 1977); and In re Eli Lilly, 902 F.2d 943, 14 USPQ2d 1741 (Fed. Cir. 1990).

Also, applicant argues, "Hegde et al. do not disclose or suggest such a barrier including, for example, each sub-layer having a specific thickness between about 0.4 and about 4.5 angstroms, wherein formation of crystalline lattice and diffusion of a chemical species through the barrier is inhibited."

This argument is respectfully traversed because the scope of the claims is not limited to each sub-layer having a specific thickness between about 0.4 and about 4.5 angstroms. Furthermore, as elucidated in the Office action, Hegde discloses "A diffusion barrier comprising a plurality of stacked sub-layers 12, 14, each sub-layer having a thickness of about 0.4 to about 4.5 nanometers (nm), to inhibit the formation of a crystalline lattice 'the second amorphous barrier layer is typically formed as a crystalline material, but is formed as an amorphous material due to the presence of the first amorphous layer,' wherein the plurality of stacked sub-layers are arranged collectively to inhibit diffusion 'prohibiting diffusion' of a chemical species through the diffusion barrier."

Applicant further states, "There is no description in Hegde et al. of the claimed structure at the claimed nanometer scale. Nor does this reference disclose or suggest the claimed multilayer diffusion barrier including the

afore-referenced film thickness, wherein the surface adhesion of each interface inhibits the formation of a lattice in the individual film layers inhibiting diffusion across the barrier, or comprising alternating films of at least two different metals wherein work hardening is substantially eliminated. Nor is the particularly claimed multilayer structure of the claimed thickness disclosed or suggested."

This statement is respectfully traversed because, as elucidated in the Office action, Hegde and/or the combination of Hegde and Toyoda discloses all of the claim limitations.

Also, applicant alleges, "Although Toyoda in column 4, line 1, recites 'lanthanide' as in lanthanide series, Toyoda does not specifically disclose lanthanum."

This allegation is respectfully traversed because, as cited, Toyoda discloses that one of the materials is "III B group elements (Sc, Y, Lanthanide)." Moreover, lanthanum is a III B group element and a lanthanide.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

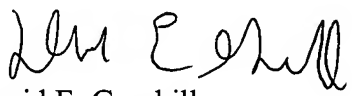
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action

and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

For information on the status of this application applicant should check PAIR: Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alternatively, applicant may contact the File Information Unit at (703) 308-2733. Telephone status inquiries should not be directed to the examiner. See MPEP 1730VIC, MPEP 203.08 and MPEP 102.

Any other telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (571) 272-1930. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.
The fax phone number for group 2800 is (571) 273-8300.



David E. Graybill
Primary Examiner
Art Unit 2822

D.G.
18-Oct-07